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Different Materials – Visual Exactness, Treatments, Tools

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During my years of experience with Boulle objects and the materials brass, pewter, tortoiseshell, horn, ivory, as well as mother-of-pearl I have always had a strong interest in the individual materials used for this marquetry type. Tortoiseshell and ivory are materials deriving from animals being under protection for several decades, and therefore are not legal to use any longer. One of the results of these measures is the rapid loss of the knowledge of these materials, their manufacturing techniques and the tools traditionally used to work them. In regard to horn and mother-of-pearl there is not much difference, since production using these materials is no longer economically viable in Europe.

As I would like to point out in the following, it is exactly this kind of knowledge – including the skilled handling of these materials - that I consider to be one of the most important requirements when restoring Boulle marquetry. Over the years I have encountered many objects with Boulle marquetry showing replacements which do not correspond with the original in either size or shape. To illustrated this I will use the example of a French bureau Mazarin made at the beginning of the eighteenth century. Its six drawers show identical, symmetrical Boulle marquetry made of tortoiseshell and brass. Figure 1 shows a detail of a drawer with all original marquetry, although due to earlier reworking of the surface its engravings is nearly all lost. Figure 2 shows the same design element on the upper right drawer front, but with replaced elements. In comparison, the replacement of the leaf ornament in the centre does differ quite obviously from the original, as it does not reflect its lobed structure. The replacement's only function seems to be to fill in for the missing section of brass. This discrepancy is puzzling, as the original silhouette had been preserved for the most part. The Figure 3 shows the same detail of a third drawer front from the same Bureau Mazarin, in which the entire brass ornament in the bottom left corner was replaced. The fill is more similar to the original than the example in Figure 2, but still wider and also different in regard to the shape of its leaves. Again, even if the original brass shape was still preserved in the surrounding tortoiseshell, the replacements do not correspond. A fact that is even more disturbing considering that producing these replacements was as time-consuming as sawing accurate ones would have been. The reason is that restorers only look at the

outline preserved in the turtleshell. By not taking the saw kerf into account the replacement elements become too voluminous, and details that are off-set only by filler are lost altogether, such as the deeper cuts which are marked with slim red arrows in Figure 1.

Figure 1. Bureau Mazarin, early 18th C. Detail of drawer front.

Figure 2. Bureau Mazarin, early 18th C. Detail of drawer front. The indicated replaced leaf ornament quite obviously differs from its original counterpart in Figure 1.

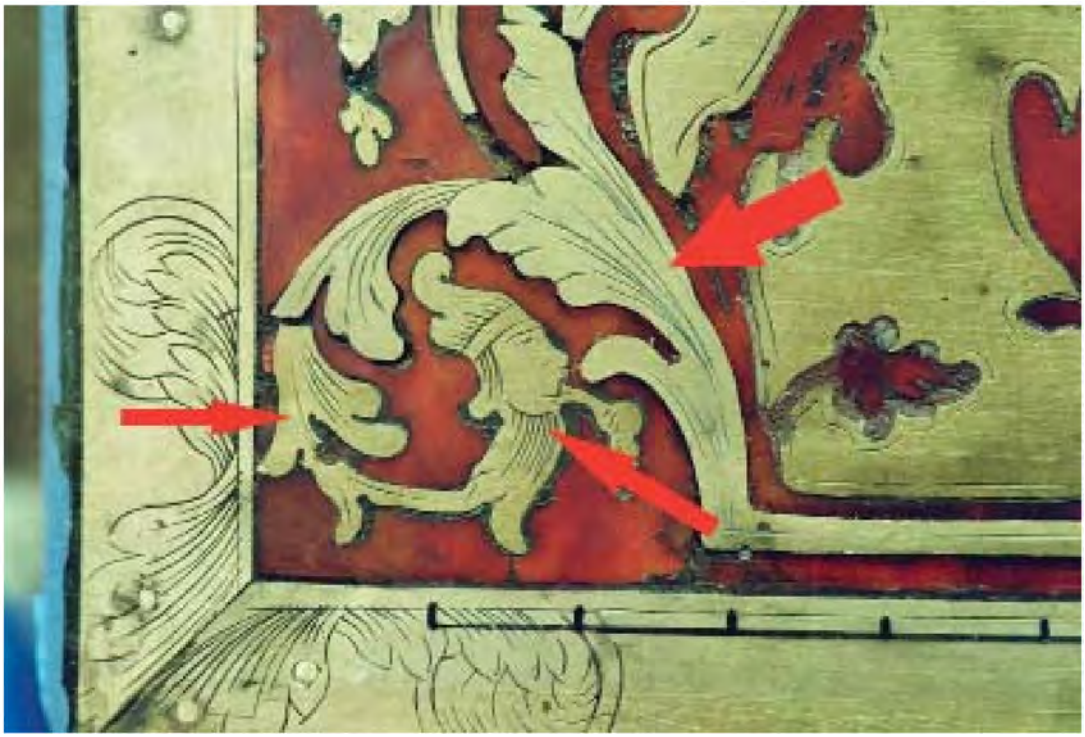

Figure 3. Bureau Mazarin, early 18th C. Detail of drawer front, with its entire brass ornament in the corner replaced.

Whenever I have seen such poor replacements I have asked myself how this kind of mismatching reproductions could have occurred. Did the restorer in question not properly examine the originals, or could it be a function of the materials he was working in? Or is it that the person had skills that were not necessarily applicable to working with marquetry made of turtleshell and brass? I would like to support the latter theory with several arguments, starting with the influence that our profession and the materials we work with have on our perception.

A carpenter works at the construction of a roof with an accuracy of about 1 mm, a cabinet maker works on a piece of furniture with an accuracy of about 0,2 mm, while a goldsmith works with an accuracy of about 0,05 mm. Each kind of craftsmanship and material has its 'inherent accuracy', depending on the nature and size of the objects being produced - something I would like to call "visual exactness." By reflecting on one's profession it is interesting to discover and maybe even quantify one's own visual exactness, and I would like to point out that this does not only has an effect on the way we look at an object, but also on the accuracy we work with. While working we develop certain manual skills, which vary between different kinds of professions.

Figure 4a Marquetry made of holly and burl walnut.
Figure 4b Boulle marquetry consisting of brass and turtleshell.

Another aspect which is not paid enough attention to is the practical knowledge regarding the handling of the different materials Boulle marquetry consists of. Made for the most part of turtleshell and brass, the marquetry is applied to furniture just like a veneer, and as such it is most often furniture

conservators who end up treating it, notwithstanding the fact that brass, pewter, turtleshell, horn, ivory and mother-of-pearl are materials from the field of goldsmithing and other applied arts. Looking at the materials of Boulle marquetry alone, this type of furniture should be sent to a conservator specializing in this field.

I would like to point out the differences between wood and Boulle marquetry by comparing two examples. Figure 4a illustrates marquetry made of holly and walnut burl, while Figure 4b contains Boulle marquetry consisting of brass and turtleshell. The size of the details shown is comparable, but if we look at the contours of the wood marquetry, we find that they are slightly uneven. Visually this is not disturbing – even more so, it is considered a characteristic of wood marquetry. Looking at a similar ornament cut in brass (Figure 4b), we find that the outer edge forms an exact line, which is possible due to the homogenous structure of the metal. To achieve a similar result in wood is nearly impossible, because of its fibrous, linear structure and the different grades of hardness inside its growth rings. Thus, the accuracy obtainable in wood does differ from that of metal. As a result, one could assume that a person being used to sawing wood marquetry has a certain "visual exactness" and will work brass less precisely than, for example, a metal conservator or goldsmith. In summary, quality of workmanship depends on a combination of visual exactness, manual skills, and experience in working a material with specific characteristics. And this principle can be applied to both newly-made articles and replacements made for conservation purposes.

Figure 5a

Figure 5b

A close look at various types of Boulle marquetry will also result in the realization that they can be extremely different from one another. This means, in turn, that different skills are required to reproduce them as part of a conservation treatment. Here are two examples:

The Boulle marquetry in Figure 5a illustrates a saw kerf that merely follows the outline of the ornaments. The example in Figure 5b, shows a saw kerf that essentially traces the ornamentation, which includes cutting into the turtleshell to define internal details. It is therefore important that the individual production details of each and every marquetry is properly captured when producing accurate replacements.

The importance of knowledge on the characteristics of the Boulle marquetry materials and their processing also becomes clear when considering the topic of surface treatment. Although originally both brass and turtleshell would only have been finely polished, the surface of restored Boulle marquetry often looks just like the example in Figure 6. Sanding or abraision marks are easy to recognize on the brass, and the entire marquetry is coated with varnish, all in an effort to recreate some of the original lustre.

Figure 6. Sanding marks are easy to recognize on the brass.

To achieve shine on a wooden surface it is first sanded with abrasive paper and then finished with varnish. Treating brass and turtleshell the same way as wood will result in a surface that is far too coarse. These naturally dense materials become deeply scratched and therefore light becomes scattered rather than evenly reflected. This is why brass and turtleshell seem dull and matte after treating them as if they were wood. The application of a varnish does not result in an appropriate surface either. Indeed, it only covers the damage, but does not repair it. Light will only reflect from the surface of the varnish , not nearly resembling the polish required for these materials.

The above example illustrates that each material commonly used in Boulle marquetry requires a different technique to achieve a reflective surface.

Pewter usually first gets compressed thoroughly by using a polishing steel. After that, its surface is shaved smooth with a very fine scraper and polished until it gleams by using fine polishes such as tripoli. Sanding pewter does not give good results, and the quality of a finished pewter surface mostly depends on a good compression of its surface.

Ivory is traditionally shaped using rasps and files, after which the surface

is smoothed with scrapers. Subsequently, the ivory is sanded with silicon-carbide abrasive paper type 400-600 and polished with pumice powder in water. For the final polish chalk priming in ethanol and a soft cloth are used. The ethanol dissolves the collagen in the ivory structure, which harmonizes its surface. Polishing with a soft cloth brings out the typical shine of ivory.

Turtleshell is cut to thickness with a special plane and then shaved smooth with a scraper. After that it is sanded with abrasive paper from 400 to1000 grit, and polished with chalk priming and tripoli.

By explaining the different types of surface treatments appropriate for different kinds of materials, it has become obvious that they not only differ from one another but that they are drastically different in comparison with the standard finishing techniques used for wood. The metals used in privately owned Boulle objects, however, do need a coating to protect against corrosion. In contrast, turtleshell, horn, ivory and mother-of-pearl do not require physical barrier layer when handled with care. I have noticed, however, that there is not only a difference in the surface treatment between these materials, but also a difference in academic approach. Wood, brass and pewter are materials still much in use and their material characteristics are therefore well-documented. These days, brass and pewter are often analysed as part of the technical study and conservation process of Boulle marquetry. As a result, information on historically used alloys are becoming more and more known.

Until the middle of the eighteenth century European brass was produced by smelting copper and calamine, leading to a copper alloy containing a maximum of thirty per cent zinc. In Europe, metallic zinc was not produced until 1746, and probably not used until the early nineteenth century for the production of brass. In India metallic zinc had already been produced since the fourteenth century, but we do not yet know enough of the early imports and use of Indian zinc in Europe. Nevertheless it could be possible to find a brass alloy containing more than thirty per cent zinc on a seventeenth century object. From time to time, when analysing pewter, apart from lead, an addition of 1-8% mercury is found. How and for what reason this was added, is still an open question.

For turtleshell, horn, ivory and mother-of-pearl hardly any technical data is available. One of the reasons is that these materials no longer play a role today's industrialized production of objects. In fact, there are hardly any workshops left that work with these materials. Very rarely, material analyses are performed on these materials during conservation, and one gets the impression that it is considered sufficient to conflate, for example, the different varieties of mother-of-pearl.

Efforts are being made to help identify and recognize the different types

of elephant ivory from Asia, East- and West-Africa, as well as similar materials derived from walrus, sperm whale and narwhal. Since the 1990 ban on international ivory trade, the few workshops that were still working with ivory have switched to similar materials: mammoth ivory, ivory from other animals, bone, or ivory palm nut.

Turtleshell is also derived from protected species, and the trade in this material was made illegal in 1973. As a direct result, what was considered to be common knowledge in workshops working with turtleshell a hundred years ago now seems to be all but lost, including the differentiation between three types of shell and their classification according to colour and structure.
In France, the turtleshell of the Hawksbill sea turtle (Figure 7a) was called rouge fonce, while that of the Loggerhead sea turtle (Figure 7b) was named cerise clair. In Germany, turtleshell was classified by numbers ranging from 3 to 12, where the former would have indicated a very dark specimen, and the latter a very 'blonde' one. Within that system, the example in Figure 7a would have been classified as a "7", and the one in Figure 7b as a "9 uni".

Figure 8 shows a detail of a French eighteenth-century clock, to illustrate that different types of turtleshell were placed on an object according to their different characteristics. The wide filé on the right is made of longitudinally-welded sections of turtleshell from the Hawksbill sea turtle, and the marquetry to its left consists of brass and turtleshell derived from the Loggerhead sea turtle. Unfortunately I do not know any museum classifying the different types of turtleshell on their objects, most likely due to the loss of knowledge how to identify the specific kind of turtleshell used.

In closing, proper conservation of an object requires more than just knowledge on how to handle different materials. It requires skills that cannot be found in written sources such as a dictionary or an online database: visual exactness, fine manual skills, and most of all, experience. For these reasons, the conservation of furniture that incorporates Boulle marquetry - or veneer of materials other than wood – demands the collaboration between furniture conservators and conservators specializing in this field.

Figure 8 The turtleshell used for the Boulle marquetry is of the Loggerhead sea turtle; the wide filé to the right is made of welded turtleshell from the Hawksbill sea turtle.

Figure 7a Sample of turtleshell from the Hawksbill sea turtle.

Figure 7b Sample of turtleshell from the Hawksbill sea turtle.